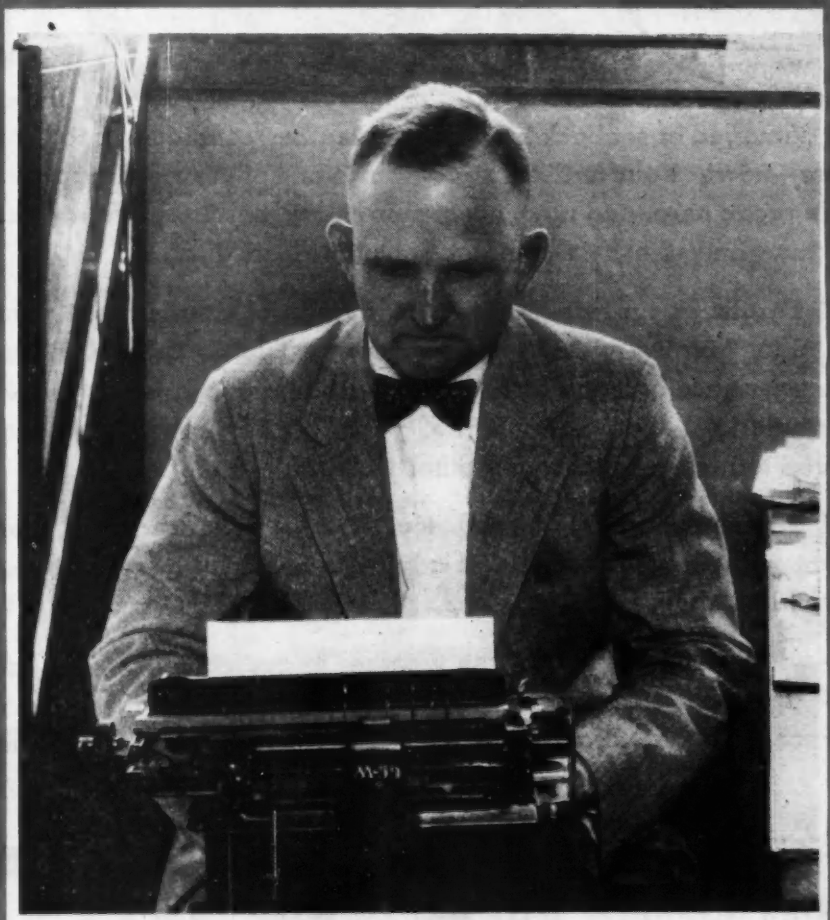
The Citrus Industry



J. FRANCIS COOPER
Extension Editor, College of Agriculture, University of Florida, Gainesville.

Vol. 28, No. 4 April, 1947

TREES damaged or set back by adverse weather conditions need the best of care—now! Your fertilizing program is one of the most important elements in grove care, and now, even more than normally, your trees should receive only the best of balanced plant food diets.

IDEAL Fertilizers provide exactly the quality of nourishment your groves need for greatest yield of quality fruit next fall. These fine fertilizers are scientifically formulated, blended and balanced from the best available materials. For more than 53 years IDEAL Brands have produced more Florida crops than any other fertilizer.

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St. Regis Paper Company

reports on 1946

Sales and Earnings at New High

	1946	1945
Net Sales	$82,782,186	$52,500,824
Net Profit	$ 5,563,604	$ 2,211,411

Properties Acquired in 1946	Additional Annual Capacity
Pulp and paper mill at (Cantonment) Pensacola, Fla.	42,000 tons of kraft pulp and 59,000 tons of kraft paper and paperboard
Pulp and paper mill at Pensacola, Fla.*	90,000 tons of kraft pulp and 86,000 tons of kraft paper
Pulp and paper mill at Buckspart, Me.	112,000 tons of pulp and 100,000 tons of printing and publication papers
Paper mills at Kalamazoo, Michigan	80,000 tons of printing and publication papers
Pulp and paper mill at Little Falls, Minnesota	10,000 tons of pulp and 12,000 tons of printing and publication papers
Paper mill at East Pepperell, Mass.	35,000 tons of kraft paper and kraft specialties

195,000 acres of Southern timberland

400,000 acres of timberland in Maine

*Under construction by company in which St. Regis has an interest.

Plant Expansion	Additional Annual Capacities
Multiwall bag plant at Pensacola, Florida (Under construction)	50,650 tons
New and enlarged bag plant facilities at Vancouver, B. C.; Dryden, Ont., and Cap de la Madeliene (Three Rivers), Quebec	20,000 tons
$6,000,000 program at Deferiet, N. Y. mill (largely completed)	30,000 tons of printing and publication papers
$2,000,000 program at Trenton, N. J. plastics plant (completed)	10,000,000 lbs. of Panelyte plastic

Development of Products, Markets and Methods of Production

Bleaching of sulphite and groundwood pulps by St. Regis patented procedure

Application of coating material to the surface of paper as it is being manufactured on paper machines

Panelyte drip baffle plates for refrigerators

Summary of Consolidated Income for the Year Ended December 31, 1946

Net Sales, Royalties, and Rentals	$82,782,186.06
Cost of Sales and Expenses	74,118,642.88
Operating Income	8,663,543.18
Income Credits	1,443,445.00
Gross Income	10,106,988.18
Income Charges	582,546.28
Net Income Before Provision for Federal and Foreign Income and Excess Profits Taxes	9,524,441.90
Provision for Federal and Foreign Income and Excess Profits Taxes	3,785,207.87
Net Income Before Deduction of Minority Interests	5,739,234.03
Deduct Minority Interests in Income	175,630.47
Net Income	$ 5,563,603.56

One-piece Panelyte door frames and breaker strips, with hidden fastening devices attached, for refrigeration

Decorative Panelyte for table tops, bars, furniture

Multiwall paper bags adapted for new fields (over 400 commodities now being packed)

Multiwall paper bags . . . expansion within existing markets

New mechanized bag-making equipment

Looking Forward

A full twelve-month operation of original and newly acquired properties is expected to increase the sales volume for 1947 to more than $110,000,000. Completion of plans for plant modernization and installation of mechanized high-speed equipment will increase manufacturing efficiency with resulting economies. The unity of interest between labor and management was furthered during 1946, and the personnel of recently acquired mills is being rapidly merged into the St. Regis organization. The Company's products continue to supply the needs of the customers engaged in twenty-one basic American industries.

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The Citrus Industry
EXCLUSIVE SPECIALIZED CITRUS PUBLICATION
Issued Monthly
Representative of every interest
Representing no special interest

Publication office at Bartow, Florida. Entered as second class matter February 16, 1920, at the post office at Tampa, Florida, under the act of March 3, 1879. Entered as second class matter June 19, 1933, at the post office at Bartow, Florida, under act of March 3, 1879.

Citrus Products Research Problems . . .

J. L. HEID
Florida Citrus Canners Cooperative
Lake Wales, Florida

Within the last year a new Council has been formed to "foster, stimulate, and coordinate research" on citrus products by federal, state, and other agencies. Approximately a hundred technologists, representing the major United States citrus producing areas in Florida, California, Texas, and Arizona, have organized themselves for the purpose of seeking to direct the efforts of established research agencies along channels of broadest and most pressing interest. Prior to this development, the citrus products industry had no representative, qualified voice, which might be used to influence the efforts of investigators employed in state and federal laboratories. Research project plans of nation-wide interest had never been prepared by the citrus industry and presented to agencies which had personnel and facilities for conducting the work. While these agencies have made major contributions to industrial developments, some projects of importance have not received adequate attention simply because their importance has not been emphasized.

At an informal conference held in Los Angeles in September 1944, about twenty representatives of the Florida, Arizona, and California industries formed a temporary organization under the name, "Joint Problems Board of Citrus Research". A. J. Lorenz served as secretary, pro tem.

Following this meeting, state sections were formed, each of which elected an executive committee to represent it in national conferences. In Florida, section officers included: J. L. Heid, J. J. R. Bristow, and L. G. MacDowell. In California, section officers included: E. J. Draper, E. M. Chace, and W. C. Platt.

A national-organization meeting of sectional executive committees was held in Tampa in January of 1945. A constitution was adopted providing for a new name; "Citrus Products Research Council". Officers included: J. L. Heid, Lake Wales, Florida, Chairman; L. S. Hamme, Weslaco, Texas, and Byron Showers, Phoenix, Arizona, Vice-Chairmen; and W. C. Platt, Los Angeles, California, Sect.-Treasurer.

For the present it is not the plan or purpose of this organization to conduct or finance research work, but rather to work with agencies possessing facilities and personnel for such work. These agencies include: Federal and state laboratories, research departments of container manufacturers, and of the National Canners Association and perhaps in some instances the research laboratories of individual processors. If it should ever appear desirable that grants be made for special work, such action would necessitate changes in the organization.

It is not the purpose of this Council to endorse or sponsor political or industrial actions, such as changes in grade standards or maturity legislation, or to cope with problems of individual processors. Efforts will be confined to seeking to facilitate and coordinate investigations on problems of industry-wide importance. In this field it will be the object of the group to work closely with associations of canners and processors.

C. P. Wilson (Research Chairman of the Council) and members of the Research Projects Committee have conferred with representatives of the U. S. Bureau of Agricultural and Industrial Chemistry; also State Experiment Stations and The Florida Citrus Commission, and have been instrumental in completing arrangements for work on several projects outlined at Los Angeles and approved at the Tampa meeting.

Ultimate Composition Studies

The Council's research program stresses the need for fundamental research upon the ultimate composition of citrus fruits in relation to variety, maturity and place of pro-

(Continued on page 22)

Study Of Quality In Temple Oranges

PAUL L. HARDING
Division of Fruit and Vegetable Crops and Diseases, Bureau of Plant Industry, Soils, and Agricultural Engineering
And
F. M. WADLEY
Bureau of Entomology and Plant Quarantine, Agricultural Research Administration, U. S. Department of Agriculture

(Reprinted from Food Research, Vol. 10, No. 6.)

During the last 10 years the Division of Fruit and Vegetable Crops and Diseases, Bureau of Plant Industry, Soils, and Agricultural Engineering, Agricultural Research Administration, has conducted investigations at Orlando, Florida, on seasonal changes in oranges, Harding Winston, and Fisher (1940), grapefruit, Harding and Fisher (1945), tangerines, and Temple oranges. These studies included changes in the physical and chemical constituents that occurred in the principal varieties of fruits as they matured and ripened on the tree, and the factors that influenced eating quality and food value.

The purpose of the present investigation is (1) to study the palatability of Tempie oranges, its seasonal trend and connection with factors more exactly measurable, and (2) to study the method used in evaluating palatability, and possibilities in statistical treatment of ratings.

The subject of tasting tests is being given widespread attention at present in food research. The extent to which qualitative ratings can be standardized, given a quantitative interpretation, and analyzed statistically is of great interest. Recent discussions include one by Howe and Barbella (1937) on meat flavor and one by Levin (1943) on dried-egg quality. The latter is similar in viewpoint to the study here reported. Fisher (1941) outlines a method believed to be of great promise in dealing with personal and qualitative ratings, but it is beyond the scope of the present study. In efforts to make such ratings more quantitative it has been found of value to limit the number of grades, to define and describe them carefully, and to check them occasionally against a standard where this is possible. These measures tend to standardize conditions for readings for all workers and occasions.

Experimental Procedure

The Temple oranges for this investigation were obtained from four experimental plots located in commercial groves at Windermere, Florida, where the soil type is Norfolk fine sand. Each plot consisted of 15 to 25 trees, and the trees of each plot were on a different rootstock, namely, rough lemon, sour orange, sweet orange, or Cleopatra (spicy tangerine). The trees were of mature age. Tests on the fruit were made at seven different picking periods and thus included a wide range of stages in fruit development and ripening, from immaturity to senility. Picking was in the first five days of each month, October to April.

It will be noted that only one plot was available for each rootstock, hence the experiment is subject to the criticism that plot replication is not provided; that we are not sure whether differences found are characteristic of rootstocks or of the plots themselves. However, the records may be used in preliminary study. The differences found in this work between fruit from different rootstocks are such as have been repeatedly noted before.

The fruit samples were taken to the laboratory at Orlando, Florida, immediately after they were picked and were placed in storage at 0 degrees C. 32 degrees F.) until tested. Each sample consisted of 60 or more fruits picked from 15 to 25 trees. The total-solids content and total-acid content were determined on the composited juice of 25 fruits. The fruits that remained were used for palatability tests.

Total water-soluble solids were determined with an Abbe (Bausch and Lomb) refractometer. Total acid was determined by titration of the orange juice with standard NaOH, using phenolphthalein as an indicator, the results being calculated as anhydrous citric acid. Palatability was determined by the method described later in this paper.

Factors Influencing Quality and Methods of Evaluating Palatability

The internal quality of citrus fruit is influenced by several factors, such as total solids, total acid, ratio of solids to acid, texture of flesh, and aromatic constituents. The age of the fruit is also important. Immature fruit is usually very acid or tart and has a raw, immature taste, whereas overripe fruit held on the tree too long may become insipid or develop disagreeable off-flavors.

Throughout this investigation assays for flavor or taste were made on the fruit soon after picking. In each test 30 to 50 Temple oranges were used. The fruits were cut transversely and from each half was cut a wedge-shaped piece for tasting. Each judge was advised to taste several pieces before rating a sample according to the arbitrary scale shown in the rating form.

Staff members of the Bureau of

Arbitrary standard	Taste or flavor of fruit	Numerical rating range corresponding to description
Very acid	Very acid, raw, immature flavor	20-39
Acid	Acid, with absence of raw, immature flavor	40-59
Tart	Too tart for consumer approval	60-69
Pleasantly tart	Mimimum stage of acceptability for consumer	70-79
Pleasantly tart to sweet	Pleasant blend of sugars and acid, with very good texture and flavor	80-100
Insipid (aged)	Very sweet, watery, lacking in flavor, low acidity, aged	50-100

Fig. 2. Rating form given to taste judges, who were informed that fruit rated 70 or below was regarded as not meeting consumer approval.

Plant Industry, Soils and Agricultural Engineering and of the Bureau of Entomology and Plant Quarantine stationed at Orlando regularly officiated as taste judges. Frequently visitors also were present, and they too were invited to score the various samples.

Thus judges available at each time were utilized, and the group was not the same every time. However, there were eight tasters who participated in every test. In all, 34 different men participated in one or more of the tests; 21 to 27 worked each time. Scoring was according to the scale described (Fig. 2).

At the beginning of the season the arbitrary standard scale to be used and the method of evaluating the internal quality of Temple oranges were discussed with a number of the staff members who were to participate as taste judges. At that time it was decided the numerical value of 70 would be the minimum standard of acceptability and that any fruit rated below that value would be considered undesirable. On the other hand desirable internal quality was rated from 70 to 100 as indicated. The scale permitted the scoring of insipid fruit (values 50 to 100), but it was understood that any of the samples of insipid fruit that were rated below 70 would not meet consumer approval.

There were some variations among individual fruits in the samples, but generally any given sample was rather uniform in flavor. However, in scoring, each judge was advised to base the rating on the average flavor, after tasting several pieces of fruit of the lot.

Analysis of Ratings

The tasters were believed to represent fairly well the prospective consumers of Temple oranges. The percentage grades given are subject to the criticisms of all such ratings; they may be somewhat subjective, difficult to standardize, and hard to keep constant from judge to judge and from time to time. There may be some doubt that they fully meet the assumptions required for analysis of variance. However, every effort was made to make the ratings sound measures of acceptability, and they may well be analyzed for what they can show.

The differences between tasters proved not to be large. Hence, the average grades for each month and each rootstock are presented even though the group of tasters was not exactly the same for any two months (Table 1).

Next a study was made of the ratings by the eight judges who worked in every period. The average rating for all four rootstocks by each of these tasters in each month is presented (Table 2); the detailed ratings are shown in Table 8, presented at the end of the paper.

The results from these eight, when averaged, were very close to those of the larger group shown (Table 1). These results gave a balanced table making possible the use of detailed analysis of variance.

While rootstock and period are reproducible sources of variation, tasters are an uncontrolled source of variation involving sampling. The interaction of rootstock and taster is logically the error for rootstocks; the interaction of taster and period, for periods. The "F" test is appropriate for these comparisons. It will be noted that duplicate ratings were not made; if they had been, an additional line could have appeared in Table 3, that of variance for ratings within subclasses. This variance could have been regarded as the error for tasters and interactions involving tasters. It would not be expected to be higher than the rather low variance for rootstock x tasters, and period x rootstock. In absence of an estimate of this variance inferences must be made.

Periods show a very marked difference of undoubted reality, mostly associated with a seasonal trend. Tasters show a difference which is undoubtedly real (statistically significant) but not very pronounced. This difference is compared with triple interaction in absence of variance between duplicates It is practically all due to rather consistent high ratings by Taster G and and low ones by E (Table 2). Differences between rootstocks, averaged through the season, are significant when compared with their appropriate error, rootstock x taster. While moderate, these differences appear significant because of the consistency with which tasters placed the rootstocks in the seasonal averages. The differences are practically all due to inferiority in rough lemon.

While, in seasonal averages, tasters were rather consistent in ranking rootstocks, the interaction of taster and period is rather high compared with triple interaction. This shows evidence of shifts of tasters in relative ratings during the season, but not enough to change ranking of

TABLE 1—Average Grades Given Temple Oranges by All Tasters

Rootstock	Period of picking, during first 5 days of							Mean
	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	
Rough lemon	27	55	78	91	95	94	83	75
Sour orange	30	58	79	93	98	96	91	78
Sweet orange	28	57	80	94	98	96	92	78
Cleopatra	27	56	81	95	98	96	92	78
Mean	28	56	79	93	97	95	89	77

TABLE 2—Grades Given Temple Oranges by Eight Tasters in Seven Periods, Averaged for Four Rootstocks

Taster	Period of picking, during first 5 days of							Mean
	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	
A	28	66	74	96	95	98	93	79
B	21	38	84	96	97	98	96	76
C	24	55	59	82	99	98	94	73
D	29	58	72	95	99	98	82	76
E	20	28	87	97	96	92	60	69
F	23	64	68	99	98	96	93	77
G	38	65	91	100	98	98	92	83
H	24	42	79	100	100	98	88	76
Mean	26	52	77	96	98	97	87	76

TABLE 3—Summary of Analysis of Variance of Grades Given Temple Oranges by the Eight Tasters Participating in All Tests

Source of variation	Degrees of freedom	Mean Square
Between periods	6	240981
Between tasters	7	4801
Between rootstocks	3	1402
Interactions:		
Period x rootstock	18	312
Period x taster	42	2681
Rootstock x taster	21	282
Period x rootstock x taster	126	15

1 Highly significant. 2 Significant.

tasters.

Some of these considerations show the difficulty noted in making ratings objective and comparable and in applying analysis of variance. It will also be noted that variation is greater with low or medium than with high quality (Table 2).

Laboratory Determinations

Acidity and solids were determined as described and are presented to show their general trends.

Analysis of variance was used in study of the acid and solids determination, separating variance for rootstocks, periods ,and interaction. There was only one determination for each rootstock-period unit, and no true error term. However, interaction variance may be tentatively used as the error estimate; it would not be expected to be lower than error.

It will be seen that rootstocks showed only very moderate differences in solids and acidity, though with the consistency shown they appear significant. Both solids and acidity differed markedly from month to month.

Correlation With Palatability

Both acid and solids readings were correlated with the palatability grades, using for the latter the average of all the eight tasters participating in every test. Since the set of 28 readings was classified by periods and rootstocks, the correlations were determined from covariance analysis, showing the relations in the different classifications (Table 7).

It will be observed that correlation of both solids and acid with palatability is almost althogether due to the month-to-month changes. The linear correlation with solids is lower than that with acids, although it seems more definite in agreeing with observed tendencies of rootstock differences. The correlation of solids and palatability, between rootstocks, reaches significance without much to spare. The acidity correlation between rootstocks was in the reverse direction from that between periods and did not reach significance. No correlation was found in the interaction classification; nearly all variation is associated with period and rootstock.

On plotting monthly means of palatability ratings against acidity and against solids, it was seen that the former trend is fairly linear, while the latter shows a more definite curvilincarity. Because of this a parabola was fitted to the solids-palatability relation using the seven

TABLE 4—Total-Acid (as Anhydrous Citric Acid) Content of Temple Oranges, Windermere, Florida, 1943-44

Rootstock	Picking periods						
	Oct. 1-5	Nov. 1-5	Dec. 1-5	Jan. 1-5	Feb. 1-5	Mar. 1-5	Apr. 1-5
	pct.	pct.	pct.	pct.	pct.	pct.	pct.
Rough lemon	2.65	1.80	1.31	1.01	0.85	0.77	0.63
Sour orange	2.68	1.88	1.45	1.07	1.02	0.83	0.77
Sweet orange	2.49	1.79	1.36	1.09	1.00	0.93	0.76
Cleopatra	2.63	1.75	1.35	1.06	0.93	0.82	0.71

TABLE 5—Total-Solids Content of Temple Oranges, Windermere, Florida, 1943-44

Rootstock	Picking periods						
	Oct. 1-5	Nov. 1-5	Dec. 1-5	Jan. 1-5	Feb. 1-5	Mar. 1-5	Apr. 1-5
	pct.	pct.	pct.	pct.	pct.	pct.	pct.
Rough lemon	7.57	8.70	9.37	10.05	11.38	11.87	12.12
Sour orange	8.72	9.40	11.17	11.70	11.98	12.71	13.32
Sweet orange	7.98	8.90	11.57	11.65	12.23	13.36	13.42
Cleopatra	7.98	9.25	10.87	12.04	12.58	13.41	14.07

TABLE 6—Analysis of Variance of Acidity and Solids

Source of variation	Degrees of freedom	Mean square	
		Acidity	Total solids
Rootstocks	3	0.0121	2.552
Picking periods	6	1.8052	14.672
Interaction:			
Period x rootstock	18	0.003	0.16

[1]Significant. [2]Highly significant.

TABLE 7—Correlation Coefficients of Average Palatability Ratings With Acidity and Solids

Source of variation	Degrees of freedom	Correlation coefficient of palatability	
		Acidity	Total solids
Total	26	—0.951	0.871
Rootstocks	2	0.74	0.972
Periods	5	—0.961	0.911
Interaction:			
Period x rootstock	17	0.17	0.01

[1] Highly significant. [2] Significant.

TABLE 8—Grades Given Temple Oranges by Eight Tasters in Seven Periods for Four Rootstocks

Rootstock	Taster	Period of picking, during first 5 days of						
		Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.
Rough lemon	A	25	69	73	90	90	95	82
	B	20	38	81	96	96	97	94
	C	25	40	70	85	100	95	90
	D	25	55	70	85	95	95	70
	E	20	23	85	90	95	90	60
	F	25	60	67	98	99	95	85
	G	38	65	90	98	95	95	90
	H	20	35	85	100	100	98	80
Sour orange	A	24	65	72	95	97	98	95
	B	21	39	83	95	97	100	96
	C	20	70	45	85	100	100	95
	D	25	60	75	100	100	100	85
	E	22	30	83	100	95	90	60
	F	20	39	70	99	99	96	99
	G	40	65	90	100	100	95	93
	H	35	60	80	100	100	98	95
Sweet orange	A	22	68	74	98	97	99	96
	B	22	38	85	97	95	97	96
	C	25	55	55	75	95	95	90
	D	35	55	70	95	100	100	85
	E	20	30	90	98	95	95	60
	F	21	65	68	99	95	98	95
	G	40	65	95	100	100	100	93
	H	20	40	75	100	100	100	96
Cleopatra	A	39	60	75	100	96	100	98
	B	20	37	86	98	99	98	98
	C	25	55	65	85	100	100	100
	D	30	60	75	100	100	95	90
	E	20	30	90	100	97	95	60
	F	25	64	69	99	100	97	93
	G	35	65	90	100	97	100	90
	H	20	35	75	100	100	98	80

monthly means of each variable. This gave a correlation index of 0.984, with four degrees of freedom. The tendency to curvature (owing to down-turn late in the season) is found to be significant. The regression equation for monthly mean values was as follows: palatability grade $= -482.0 + 93.0S - 3.75\ S^2$, where S is percentage of solids.

Palatability ratings thus show a close negative association with acidity in the month-to-month change but not between rootstocks. They show a close positive association with total solids, both as between months and between rootstocks. In the month-to-month correlation the relation is apparently a curved one, a peak of palatability coming between 12 and 13 per cent solids. The computed maximum of the curve is at 12.4 per cent solids.

Conclusions

Palatability ratings of Temple oranges show a marked seasonal trend, palatability rising rapidly through the late fall and early winter, reaching a peak in late winter, and dropping off a little in early spring. It is concluded that difference between rootstocks were not marked but there was indication of some inferiority in rough lemon. Tasters showed differences but not large ones. Acidity and solids showed marked seasonal trends, the former decreasing, the latter increasing; and rootstocks gave only moderate differences in acidity or total solids of the fruit. Palatability was highly correlated with both acidity and solids. The relation between palatability and content of solids seemed more consistent than the palatability-acidity relation, and could be represented by a curved graph, palatability increasing with solids up to about 12½ percent and falling off with further increase of solids. Some features of analysis indicate difficulties in securing objectivity in the ratings. The definite association between palatability ratings and some more exact measurements indicates, however, that the ratings are rather satisfactory in measuring quality.

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The Citrus Industry

with which is merged The Citrus Leaf
Exclusive publication of the Citrus Growers and Shippers

Publication Office 550 North Broadway, Bartow, Florida
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Published Monthly By
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LEGISLATORS AWAIT INDUSTRY ACTION

A poll of Florida legislators conducted by the Associated Press indicates that the members of Florida lawmaking body are not disposed to act in the matter of enacting new citrus laws or amending laws now in force, until and unless the industry itself unites on some definite program. The poll also indicates that the legislators will act favorably upon any program which has the support of a major portion of the industry.

Most legislators appear to feel that what the industry needs is not so much additional legislation as a sincere attempt on the part of the industry itself to get together on some program which will assure the trade and the ultimate consumer that nothing but fully mature fruit of highest quality shall find its way to market. Practically every legislator interviewed stresses the thought that only quality fruit must find its way to market if additional legislation is to be of any effect. This thought is forcefully expressed by Senator N. Ray Corroll of Kissimmee, who says:

"The citrus industry cannot expect to strengthen itself until it is itself honest. We cannot hope to have Northern markets when we ship unripe and insipid fruit. We are neither helping the industry nor the State of Florida by selling fruit before it has matured."

Senator-Elect Wallace E. Sturgis of Ocala says:

"The solution of the citrus problem lies primarily in what the industry does to help itself, secondarily in what the legislature may do for its benefit:"

"I do not think legislation alone will solve the problems of the citrus industry," explains Rep. Perry E. Murray of Polk County. "If the industry can unite on a program, then legislation may prove helpful."

Rep. John Branch of Hillsborough: "I think that something should be done to keep surplus fruit off the competitive market so that added demand would raise the value of the citrus that comes into the competitive market."

Every legislator contacted expressed confidence that the legislature will act favorably upon any program the industry itself may propose, but that it is up to the industry to first put its own house in order and to unite on some definite, workable program before asking assistance from the legislature. That thought is right in line with recently expressed views of prominent leaders within the industry. First the industry must become united on some definite plan of action, then go before the legislature with the assurance that a united industry will get the kind of legislation it seeks.

GOLD DAMAGE GROWS

The further we get away from the freeze of February 6 and the several cold spells which followed, the more apparent it becomes that first estimates of fruit loss and tree damage were totally inaccurate. It is now apparent that the loss of fruit is vastly greater than at first supposed, while damage to trees, which at first was thought to be negligible, now appears to have been extensive in some sections of the citrus area. That this injury to trees will be felt in lessened production next season is the belief of many growers.

Believing that the first estimate made by Federal agencies placing the loss of fruit at some eleven million boxes was grossly inaccurate, and that the loss was nearer thirty million boxes, a resurvey has been asked by a group of growers and shippers and by the Growers' Administrative Committee. While it is felt that it is now too late to undo the damage caused by the first inaccurate estimate, it is believed that such a resurvey will have its effect on future shipments of Valencia oranges now going forward in heavy volume. Such a resurvey also would tend to clarify the injury to trees which is now felt to be extensive in some localities.

TREE INJURY REPORTED HEAVY

Field men for fertilizer and insecticide concerns operating throughout the citrus belt report that considerable tree injury is developing as the result of the February cold spells. Trees which at first showed no signs of injury are now showing definite signs of extensive damage. It is the belief of these observers that trees thus damaged have been so weakened that next season's crop will be seriously affected.

Certain it is that extra care should be exercised in caring for groves which were injured by the freeze. Fertilizer and insecticide programs and other cultural practices should be carefully studied and effectively applied to bring the trees back to normal healthy condition as quickly as possible. More than usual care should be exercised if permanent injury is to be avoided.

With advancing prices at auction markets and canning plants Florida citrus growers are hoping that the latter part of the season may help to offset the below-production-costs of the early season.

Forty Years of Service To The Canning Industry . . .

National Canners Association Information Division

Florida's citrus canning industry is the first canning group in the Nation to take advantage of the services and facilities offered by the new mobile field laboratory trailer of the National Canners Association, N.C.A. officials have announced.

The entirely motorized and completely modern field laboratory unit, which came here from N.C.A. headquarters in Washington, D. C., will use Lake Wales as an operating base while making surveys of most of Florida's citrus canning plants.

The purpose of the survey is to further the work already being done by the Florida citrus canning industry in maintaining the highest possible standards of cleanliness and sanitation in the handling and processing of its products. To continue this program, the N.C.A. field laboratory has been asked to survey citrus canning operations, determine whether any steps in the process require special attention, and suggest the most efficient means of improving the canning technique.

This work is largely exploratory at present, for it is not definitely known that any difficult problems exist in the sanitary control of citrus processing, a spokesman for the Florida canning industry said. However, this sort of survey has been helpful in other branches of the canning industry, and is welcomed by Florida canners, who are keenly interested in research, and is in furtherance of research activities carried on by the Florida Citrus Commission and the Florida Canners Association.

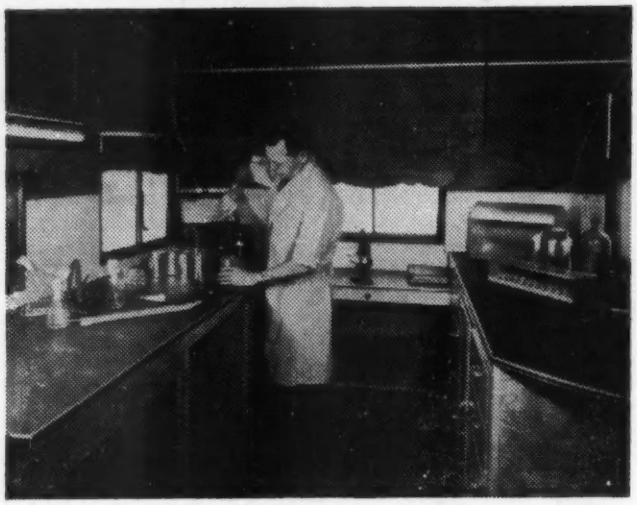
View of rear interior of National Canners Association Mobile Field Laboratory where preparation and sterilization of laboratory ware used in bacteriological tests is carried out.

For the next six weeks, a trained staff of N.C.A. technicians, using the new 24-foot mobile laboratory as a base, will survey the canning plants throughout the citrus canning areas. The trailer, adapted and equipped as a full-fledged mobile bacteriological laboratory, is merely the latest of the several improvements that dot the history of this unusual scientific service to the canning industry, which began 20 years ago when the National Canners Association, finding it desirable and practical to check laboratory results under actual conditions in the canneries, started the practice of shipping out portable laboratory units packed in boxes. This method was later improved by fitting up a truck, parking it at some centrally-located plant and bringing samples in for study from neighboring canneries by motor car. Improvements tending towards more compact units and better equipment have been constant through the years.

The "know-how" development by the N.C.A. Laboratory was called into service during the war by the Subsistence Research and Development Laboratory of the U. S. Quartermaster Corps when it placed in operation large mobile field laboratories in the form of trailer type trucks for making surveys in can-

The new mobile laboratory of the National Canners Association, which serves canners in the field, shown as it started for Florida—first stop on 1947 field trip.

ning plants preparing foods for overseas shipment. N.C.A. technicians helped with the design and operation of these units, trained the Army personnel in field laboratory methods and served in an advisory capacity. In fact, some of the Army personnel were former members of the N.C.A. staff, so assigned because of their knowledge of method and procedure.



View of work space in fore end of National Canners Association Mobile Field Laboratory showing member of staff is making bacteriological examination of canned foods.

With resumption of peace time production programs in the canning industry the laboratory on wheels has now another progressive advance. The panel truck has been superseded by a new and commodious trailer with ample working space for three or four people. It is fitted with work benches around its forward compartment and across the back.

Major equipment includes an electric refrigerator, and commodious electric incubators have been built in. A steam pressure sterilizer, essential for sterilizing glassware and culture media, is installed and can be operated either from an outside steam supply or by the bottled gas from the trailer supply, which is also piped to the work benches. Sinks and ample cupboard, drawer and desk space complete the fixed equipment of the laboratory, and it carries the usual paraphernalia of the bacteriologist—microscopes, a pH meter, jars, plates, tubes, petri dishes, etc. Complete in itself, the trailer laboratory requires only an outside source of water and electric current, which it can obtain at the canning plant when it is "on location".

Bacteriologists at work in Mobile Field Laboratory operated in the canning areas by the National Canners Association. Unit contains laboratory equipment, incubators, refrigerators.

Later in the season, following its Florida assignment, the trailer laboratory will engage in surveys at pea, corn and tomato juice canneries in the Midwest. Since the inauguration of this service, by the National Canners Association, some 900 canning plants in nearly half the States of the union have been visited and canning procedures for more than 20 different canned products have been surveyed.

Okalcosa County farmers recently obtained 100 bushels of certified sweet potato seed from Louisiana for bedding to produce draws and 11,000 kudzu crowns for conservation and grazing, according to County Agent Fred W. Barber.

America's 1946 farm products were above average in both quantity and quality.

"Quick Decline Disease" And Tristeza

By
H. P. OLMO and SYLVIO MOREIRA

In view of the importance and the great interest of Florida citrus growers in both Tristeza and "Quick Decline," the following report of horticultural experts who studied the disease is reproduced from the February issue of the California Citrograph. Tristeza is now being investigated by a party of American scientists working under the direction of Dr. A. F. Camp, vice-director in charge of the Florida Citrus Experiment Station. Observations of Drs. Olmo and Moreira indicate that there may be some connection between Tristeza in South America and "Quick Decline" in California.

Introduction

A destructive citrus disease of South America, called "tristeza" in Brazil and "podredumbre de la raicilla" or rootlet rot in the Argentine, has recently been linked by Webber (12) with similar troubles that appeared first in South Africa about 1899 and in Java in 1936. In the two latter countries the difficulties in growing the sweet orange, mandarin, and certain other species on the sour orange rootstock (Citrus aurantium L.) were heretofore attributed to "graft incompatibilities." In comparing the known facts, Webber elaborated the theory previously mentioned by Bitancourt that the disease might be caused by a virus present in sweet orange, mandarin, and grapefruit; but that the foliage of lemon and sourorange normally produces some product that inhibits its action and development.

The disease caused no extensive damage in established plantings until it appeared in commercial groves of sweet orange grafted on sour orange in the region of Bella Vista, Argentina, about 1932. The loss in this small citrus area, where about 60 per cent of the trees were on sour rootstock, is already estimated at $125,000 (6). However, in Brazil, where about 80 per cent of the total citrus acreage is on sour stock, the disease has been even more disastrous. First noticed in the Paraiba Valley, Sao Paulo State, in 1937, it has spread the lengths and breadths of the states of Rio de Janeiro and Sao Paulo, and at the present time it is doubtful if a single planting on sour orange rootstock is free of the disease. The total number of trees already destroyed or rendered worthless in Brazil and Argentina may be conservatively estimated at not less than 8 millions.

The purpose of the present paper is to compare the known facts and observations of the "quick decline disease" of California and the tristeza of South America. The senior author has examined typical diseased trees in both southern California and Brazil. At this time no discussion concerning the various hypothese advanced to explain the cause of the disease will be presented, except to state that those advanced in South America and in California have followed along parallel lines. The hypothesis that a virus is responsible is now the most widely held.

1. The disease at present is mainly confined to a portion of the San Gabriel Valley in southern California. There has been a moderate but constantly accelerating rate of spread during the past six years, mainly to the north and east. This suggests a contagious disease that is of local origin or has been recently introduced, in view of the fact that trees from four to fifty years of age or older are being affected.

2. Thus far the disease has apueared only on sweet orange varieties that are grafted to sour orange rootstock (1). In no instance do oranges show the disease unless the rootstock is sour orange.

3. As yet no specific symptoms have been noticed that will for certain identify a tree as having the disease. The primary injury associated with the disease appears to be confined to the fibrous feeder root system and results in their death. Tests with iodine solution demonstrate that the roots of diseased trees are usually devoid of starch (5). The secondary effect most characteristic of the disease, at least with young or bearing trees in recently established plantings, is a sudden wilting and collapse of the foliage. These foliage symptoms appear to be due to inability to obtain an adequate water supply. Collapsed bearing trees commonly carry larger than average crops, and the fruit fails to reach normal size.

4. The orchard soils concerned are sandy or gravelly, and the affected trees occur in the lighter textured and lower spots, thus indicating a possible soil moisture relationship with the rapidity of tree decline. However, diseased trees have been reported on fairly heavy soils (1).

5. When diseased trees are severely pruned, they exhibit a certain recovery, but the new growth is less than that of apparently healthy trees.

6. Washington Navel grafted on sour orange rootstock, and later, topworked on the scaffold branches with lemon, appear free of disease in areas where the same trees left without conversion to lemon top are badly affected.

7. The starch test applied to the inner surface of the bark above and below the bud union by Bitancourt (3), to determine the presence of tristeza, could not be confirmed in California. Only some trees in later stages of decline showed the absence of starch below the graft union when the test was made on the outer surface of the intact bark. Because of these results. Fawcett (5) is inclined to consider the quick decline as a disease distinct from tristeza.

Observations and Reasonabdly Well-Established Facts Concerning the Tristeza of Citrus in South America

1. The tristeza was first noticed as an alarming disease in 1932 in Argentina, in the region of Bella Vista, situated in Corrientes province in the northeast corner of the country, bordering Brazil and Paraguay (4). Symptoms of the same trouble were next recognized in San Carlos in the Missiones Territory to the

northeast in 1937, in groves of sweet oranges on sour stock, that were imported as grafted nursery trees from Florida. Progressively the disease appeared in the Departmento Capital in Corrientes in 1938 and in Obera, Missiones in 1939 (11). By 1945, all of the other principal citrus districts, including those of Salta, Tucuman, and Iujuy, far in the interior of the country, were reported as having the disease (6); although Schultz (10) and Moreira (8) believe these sections are yet free.

In Brazil, trees having the same malady were first reported in Sao Paulo State, from Jacarei in the Paraiba Valley in 1937 and also in Sorocabana, about 60 miles to the west of the city of Sao Paulo. At this time the disease had already been established for several years because some groves in Sorocabana were already in an advanced state of decline with many dead trees (7). Farther to the north in Campinas and Limeria the disease was encountered in 1938. In the larger plantations farther inland around Araras and Pitangueiras symptoms of decline of some trees were noticed in 1942. From all sections of the state, even in scattered plantings, reports from the Extension Service and growers indicate presence of the disease and dying trees. The range of age of affected trees is wide, from one year after nursery budding to thirty or more years. In certain sections in the Argentine (6) trees have shown decline in the nursery.

2. The disease is destructive primarily on sweet orange, mandarin, and grapefruit when grafted on sour orange rootstock (3, 6, 7, 11). All varieties succumb at about the same rate, although there is some evidence that varieties which bear heavily die more rapidly; for example, the Barago sweet orange in Brazil appears slightly more susceptible than the Pera or the Washington Navel. In California the disease has not spread as yet into areas where grapefruit and mandarin are grafted on sour stock.

3. After twelve years' observation of the disease by Argentine workers and over seven by the Brazilians, no symptoms have been uncovered that will identify the disease with certainty. The primary injury found consistently in affected trees is a death and disintegration of the fibrous root system (3, 4, 6). The roots of declining trees are almost devoid of starch, in tests made in Brazil (9). The same phenomenon is observed in Argentina (6).

The "sudden wilting and collapse" of the tree is not usual in Brazilian or Argentine citrus districts, although such symptoms do occasionally occur. There is first a paralysis of top growth; few or no new shoots of normal length are produced in the expected flush cycle of growth, otherwise the trees appear normal. Next is a slight yellowing of the foliage, easily visible from a distance. There is an intermittent dropping of the older and larger leaves at the bases of matured twigs and branches, until the interior scaffold limbs of the tree can be seen. There are attempts at pushing forth new growth after severe periods of leaf fall, but this new growth is weak, light green in color, small-leaved and short-noded, giving a rosette appearance. Leaves keep falling until the tree is defoliated except for weak terminal shoots. These may dry back from the tip in advanced stages of the disease, leaving finally the bare skeleton frame-work of the tree. From the first symptoms of growth paralysis to the death of the tree may require from five to six months to five or six years.

Bearing trees affected with tristeza appear to be overloaded with fruit of small size, which never colors well, is thick skinned, is less juicy, and insipid in taste. However, the trees might only appear to have more fruit, because it is more exposed to view after the severe thining of the foliage canopy by leaf fall and the decreased growth.

4. Orchard trees of sweet orange on sour stock decline most rapidly on sandy or impoverished soil types, or in general on those which fluctutate markedly in moisture content between seasons (11, 7), yet trees dying of the disease are found on

all of the main soil types in Sao Paulo State.

5. Even trees in advanced stages of tristeza will exhibit some recovery if the tops are stubbed or pruned back heavily. The degree of recovery is progressively less as the decline becomes more accentuated. Top generation is weak, small-leaved, and the shoots are short-noded. Any operation tending to reduce the leaf surface of a diseased tree will result in some recuperation, as the partly destroyed root system can then more nearly reach equilibrium in its water intake and satisfy the smaller transpiring area of the top. No permanent recovery or even resumption of normal seasonal growth has been observed from such pruning practices.

6. Washington Naval trees on sour orange that are already showing tristeza symptoms, can be regrafted on the scaffold limbs to lemon, and the recuperates, putting forth vigorous and normal foliage regenerate a new root system.

7. The starch test was first advocated by Bitancourt (3) as a possible means of distinguishing trees attacked with tristeza before symptoms of degeneration appeared. The reaction described was a noticable darkening of the tissue of the sour orange of the inner bark when compared with the tissue of the sweet orange above the line of union. However, these reactions were not too definite, as tests made on more trees indicated. A greater contrast is usually found when iodine solution has been applied to the lightly scraped bark left in place, exposing the chlorophyll-bearing zone. In this case the sour orange tissue stained faintly while the sweet orange tissue above the line of union darkened with the starch reaction. Since these tests are only very relative and the variation in intensity of the reaction is great, it appears probable that the discordance noted between the tristeza and quick decline is more likely due to the method of making the test and the interpretation of the relative difference found. There is agreement between Fawcett and Bitancourt on one important point, namely, that with most trees in advanced stages of decline, the outer bark is almost completely devoid of starch below the union, while the sweet tissue above shows a strong starch reaction. In any case, the differences in reaction can hardly have much significance, as no one employing such a test would be rash enough to claim it as a specific test for the disease in question, whether it be quick decline or tristeza. It must also be noted that the climatic conditions, and hence the duration and extent of the growth cycles in the San Gabriel Valley in California, are markedly different from those of the interior of Sao Paulo State.

Conclusions

The symptoms, mode of occurrence, the species attacked—in fact, all the observations reported thus far that apply to the tristeza—seem to closely parallel those of the "quick decline disease" of California, which seems to argue that the same or a very similar infectious agent is probably responsible. Granted the assumption that the tristeza might be the same as the California malady, it is entirely possible that all varieties of sweet orange, mandarin and grapefruit grafted on sour orange rootstock might succumb or be rendered worthless within a few decades. The importance of immediate and thorough research work in an attempt to stop its spread is already recognized in California, but there are yet millions of trees of susceptible combinations in Florida, Texas, and the Mediterranean countries subject to attack, where no attention has yet been focused on the seriousness of the problem.

The authors are indebted to Professor A. A. Bitancourt, who kindly read the manuscript and made available for consultation certain unpublished reports.

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(Continued on page 18)

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JACKSONVILLE, FLORIDA

Growers Demand Resurvey Of Damage From Freeze

By Jack Gurnett

Demanding that the government make " a new and immediate" survey and check of loss and damage to the current Florida citrus crop because of the Feb. 6 freeze, a group of prominent grower-shippers has declared the actual loss figures will approximate 30 million boxes instead of the 11 to 12 million reported by the USDA.

This group, for which C. V. Griffin of the Vaughn-Griffin Co., Howey, is the spokeman, following a conference at Lakeland and what it described as "a comprehensive summation of the conditions in all areas of the state" predicted that not more than 8½ million boxes of oranges, mostly Valencias, remains to be shipped from the state this season.

"We feel that the USDA survey was made too soon after the actual freezing temperatures of Feb 6, and did not take into consideration all the subsequent cold snaps, nor did it reckon with damage that has since materialized," Griffin said.

The grower-shippers joining with Griffin in the move to get a new survey include: Fred T. Johnston, sales manager of the Florida Citrus Exchange with some 50 cooperative member houses over the state; R. A. Carleton, general manager of Plymouth Citrus Growers Association at Plymouth in Orange County; Latt Maxcy, extensive Polk county grower-shipper-canner; Charles A. Stewart of Auburndale, grower-shipper Chester A. Fosgate, president of Fosgate Growers Cooperative, Forest City; J. M. Morrow, executive vice president of Adams Packing Co., Auburndale; John A. Snively, Sr., extensive grower-shipper-canner of Winter Haven, and Dodge Taylor, associated with Griffin.

In discussing the conference Morrow said "we have all agreed that both the industry and the trade will be sadly mislead by the USDA figures which, in our opinion, badly understimate the loss."

Both the Florida Citrus Commission and Growers Administrative Committee, handling the details of the federal marketing agreement for Florida citrus, will be asked to join the petition for the new survey.

Morrow estimated shipment of 1,400 cars of oranges weekly between now and the end of the season, which he forecast for June 1, would "move the crop in an orderly manner and at increasingly favorable prices to the growers." Morrow said "while everyone is talking about the Feb. 6 freeze, actually the state had three damaging cold spells following that date—including one the morning before the embargo became effective on Feb. 17."

There was no inclination among the group, representing a large percentage of the oranges still in the state, to castigate anyone connected with making the estimates, but merely an effort to "get to the facts and put the loss figures on a sensible basis."

The group said it would, individually and collectively, recommend that the current regulations on oranges, governing grade and size that can be shipped in interstate commerce, be held "as is" for at least another two or three weeks. None of the group wanted the rules eased—nor would the individuals suggest that they be tightened. "I believe the current rules are as near satisfactory as we could get them," Keen commented.

The citrus inspection bureau and George E. Copeland, supervising inspector, were "highly commended" for the work they have been doing in checking offered fruit for shipment, Keen added. He said that he had been been picking from 4,000 to 5,000 boxes of oranges a day and packing out not more than 1,000 to 1,500 boxes for fresh fruit shipment.

Morrow commented that the canneries were making "the best juice this year" out of the packing house eliminations It was reported that canneries are now paying 70 to 85 cents a box delivered for oranges, up from the 50 cents of a week or 10 days ago. It was the general opinion that the canning orange price would jump to $1 delivered within a short time, possibly within a week to two weeks.

Johnston said in his opinion good Valencias will bring "a premium" to the grower during mid-April and May —and it was the general suggestion that growers with good Valencias hold on to them until the market gets stronger.

The fact that with the exception of Johnston and Carleton the group is made up of independent shippers who have to go out and buy the crops, and they were urging growers to hold for more money, is something unusual—to say the least, observers point out.

"We are going to ask for another and immediate survey, because the original report on damage and loss was, in our opinion, made too early and before all pertinent facts could be gathered, compiled and given their proper weight and importance," Griffin concluded.

It was the general consensus that with midseason oranges rapidly disappearing from the current market scene, that many more houses would switch over to Valencias and that instead of last week's shipments of 45 percent midseason and 55 percent Valencias, the current week would show about 30-70 split, next week about 15-85 and subsequent periods practically confined to Valencias.

The shippers in the conference made it plain that they had no personal axes to grind, that each of them had been hit hard by the weather setbacks—but they merely wanted all the facts given to the trade "just as concisely and accurately and completely" according to Griffin.

"QUICK DECLINE DISEASE" AND TRISTEZA

(Continued from page 16)

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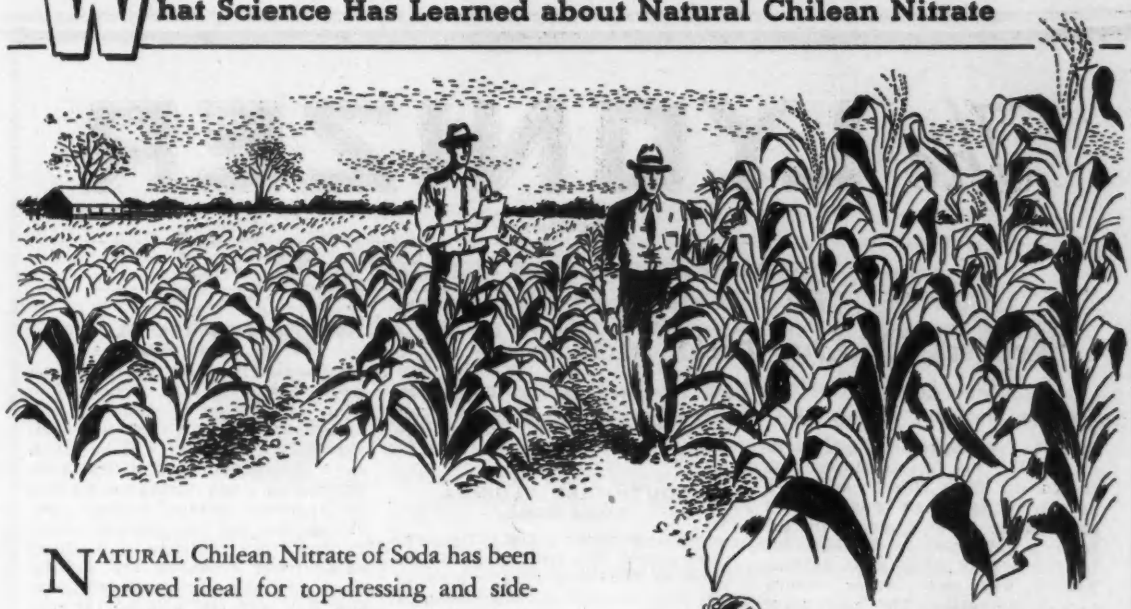
Spuds Johnson says it takes a long time to feather a nest on a wild goose chase.

What Science Has Learned about Natural Chilean Nitrate



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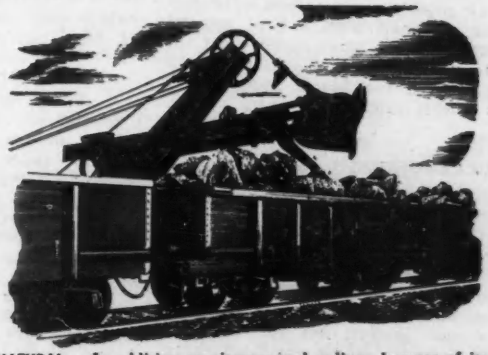

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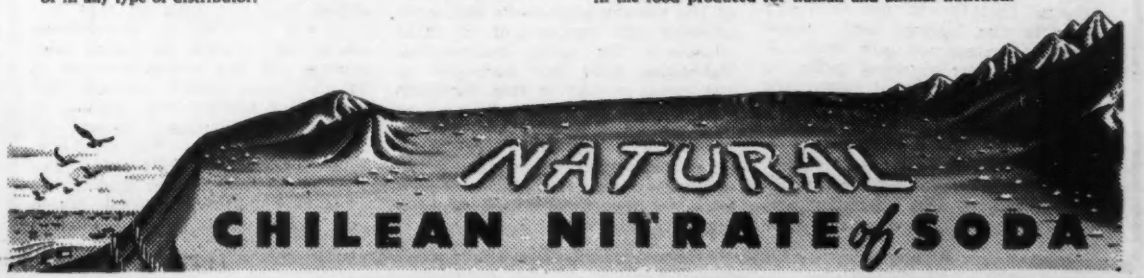

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Reports Of Our Field Men . . .

POLK COUNTY
J. M. (Jim) Sample

With the appearance of warmer weather the freeze damage has shown up more clearly and to a greater extent than was at first anticipated. The damage to the fruit is now plainly evident and by the first of April most packing houses will have water separators in operation. The percentage of damaged valencias is expected to run high with estimates ranging from 30 percent to 50 percent of the total crop. As usual this freeze was different from others and presented many freak results. In some groves where new growth and bloom were out, the freeze split large limbs and killed wood and foliage in the tops of the trees while the new growth and bloom on the lower half of these same trees was not damaged. It is a generally accepted conclusion that next year's crop will be curtailed as a result of the freeze, with most estimates agreeing on a minimum of 25 percent. The price on frost free valencias has stiffened with a firm market expected for the latter part of the season. The protracted cold spell held the bloom back but it is slowly appearing now.

HILLSBOROUGH & PINELLAS COUNTIES
C. S. (Charlie) Little

Groves throughout this section are in very fine condition. Bloom is beginning to make an appearance and most of this bloom is coming on old wood with very little new growth yet in evidence. We have had some excellent rains during the past few months and this will be of much value in setting this crop of fruit. We are hopeful that it will not turn dry later in the spring and cause heavy droppage of new fruit. A number of our growers failed to make an application of topdresser this spring and are now planning to come in with an early summer application of fertilizer with a complete range of secondaries. The recent freeze did practically no damage in this territory and as a result most growers are holding their valencias until a large percentage of the damaged fruit from other areas is out of the way.

SOUTHWEST FLORIDA
Eaves Allison

Cold weather and frequent rains since the freezing temperatures of last month have been of material benefit to the damaged citrus crop. However, this same condition has been disastrous to the spring truck plantings which are weeks behind normal schedule. Citrus prices have improved considerably since the freeze and celery and gladioli prices have been high. Later inspections have shown considerable freeze damage to citrus in the Ft. Myers area and somewhat more than was first thought in the Hardee and DeSoto County areas. Manatee and Sarasota Counties escaped with slight damage. On the whole the general outlook for next year is much more optimistic and citrus growers are again turning their attention to proper fertilization for maximum production of high quality fruit.

WEST CENTRAL FLORIDA
E. A. (Mac) McCartney

Owing to recent rains and because of the fact that many growers failed to make an application of topdresser this spring the summer application will be earlier this year than is generally the case. Even though prices have not been what was expected, most growers feel that it is necessary to keep their groves in excellent condition and as a result will go forward with their application using a well balanced mixture containing ample amounts of all necessary secondary elements. Valencia prices are getting better as the season progresses and most growers are encouraged at their prospects for later movements. Valencias were not damaged to any great extent in this territory by the recent freeze. Groves as a whole are in fair condition, banks on young trees are being taken down, and on low land some of these young trees were frozen back to the bank. These are being cut back.

NORTH CENTRAL FLORIDA
V. E. (Val) Bourland

Immediately after the freeze we realized that we had considerable fruit damage as a result of the cold weather, but we are now convinced that the loss will be much more severe than was at first anticipated. In many instances we had no apparent foliage damage, but during the last few days we have noticed fruit damage on these same trees. Growers are getting their fertilizer program well under way and we will be through with this operation by the middle of June. The watermelon crop in this territory received a bad set back by the cold weather and many growers were still planting the first of March which will mean that the shipping date of the first cars to move will be much later than in former years. Vegetable crops have been hard hit by the continued cold weather, but growers have been very persistent in their effort and with favorable weather these crops should get under way on an acreage comparable to the plantings of other years.

SOUTH POLK AND HIGHLANDS COUNTIES
R. L. (Bob) Padgett

The freeze did considerable damage not only to fruit and foliage in this territory but in many cases we had severe wood damage. Foliage loss was heavy and most growers have made an application of topdresser to supply nitrogen for the new growth that is now making an appearance. This will be followed with an application of topdresser later in the summer. We are getting some bloom even on trees that were defoliated but it is quite questionable as to how much of this crop will be set. It is the general consensus of opinion that with the trees in a weakened condition that the crop in this section will be light for the coming marketing season. A large percentage of the valencia crop is off the trees either through the process of having been picked or by natural droppage caused by the cold weather. We do know some crops that withstood the freeze in good shape and these crops are selling at good prices even for immediate movement.

ADVERTISEMENT—LYONS FERTILIZER COMPANY

Some years ago Florida growers used to put a lot of emphasis on Quality Fruit, but here the past few years the market has been so good that most any old kind of fruit brought pretty good prices, so we hain't been payin' much attention to Quality. Now again though we got to start figurin' on raisin' good fruit, as well as doin' the job of raisin' a lot of it. It ain't too hard to do neither, what with fertilizer and insecticide companies havin' men who know just what to do to raise quality fruit. Even if you have to get a box or two less fruit to the acre, you'll find that you'll make more profit out of raising the kind of fruit that will please the customers and make 'em come back askin' for more.

There has been a heap o' talk about how to find the best way of keepin' fruit prices up to where they'll bring a profit to the grower. A lot of this talk has been centered around the fruit shipped by the packer, while the canner has continued to put up their tonnage from good fruit, if it was available and if it wasn't from the fruit that was left. If the packer has to keep the fruit he ships up to certain standards, then it looks like the canner ought to be restricted to the sort of fruit he can put in cans. Not too many years ago they was a heap of cull piles in this state that helped to keep Florida's reputation for good fruit in good order. We ain't seen many cull piles lately. Maybe we need more of 'em.

They was a lot of groves in Florida that was badly damaged in the recent freeze, that will take a lot of care and nursin' to git back into shape. It'll pay the growers to know that they'll need a lot of nitrogen, well balanced with other plant foods to do the job right. And after the fertilizer is applied and new growth begins to show it will be time to spray with the proper ingredients. Lyons Field staff can advise any grower just the right sort of program to follow. These men know their stuff and they'll be mighty glad to advise with you.

A lot o' vegetable crops was hurt bad by the freeze too, and the recent rains has hurt some of 'em too, but it looks now like the crops which is bein' replanted will be ready in time to serve their annual job of supplyin' the tables of the nation with plenty of fresh Florida vegetables.

Uncle Bill

CITRUS PRODUCTS RESEARCH PROBLEMS

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duction. Much information has been accumulated in past years upon the proximate composition of citrus fruits. Commercial methods for canning citrus juices have been improved as a result of investigations and experience. Members of the Council have expressed the opinion that the industry has now arrived at a point where further improvement in the storage quality of canned juices, might best be promoted by securing detailed qualitative and quantitative information regarding enzymes, nitrogen compounds, carbohydrates, pigments, oils, fats, waxes, ash, and other constituents of citrus fruits.

It has been observed that when favorable methods are used, canned grapefruit juice deteriorates more slowly at high temperatures than canned orange juice, while the rate of deterioration of blended juice is intermediate between the two. Juice of tangerines and naval oranges is subject to the most rapid deterioration at unfavorable storage temperatures. Reducing storage temperatures extends the storage life of canned citrus juices and suitable methods of quick freezing and storing at 0 degrees F. permit holding these juices for several years without appreciable loss of quality.

It was the opinion of the Citrus Technologists that a detailed study of the ultimate composition of these fruits might reveal variations which could be correlated with the stability of canned juices at unfavorable storage temperatures, and might furnish valuable clues to improvements in methods for processing.

Contamination Studies

Another study recommended by the Council is: the effect of contamination of juices by metals and micro-organism, and the effect of changes occuring in citrus juices during processing. Valuable information has been accumulated in this field, but the opinion of the Council was that further studies would be helpful.

Standard Methods of Analyses

In connection with improvement in standards for citrus juices the organization has called attention to the obvious need for improvement and standardization of analytical methods to make them uniform and as widely applicable as possible. Emphasis was placed upon methods for determining peel oil, solids, ascorbic acid. and air in canned juices.

The present method used for determining peel oil requires 80 minutes and the accuracy may be affected by slight variations in laboratory technique. Losses of oil vapors and inaccuracies due to surface tension phenomena are problems in addition to the desirability of shortening the time required to complete a test.

The determination of total solids (or moisture) in citrus juices, concentrates and powders is complicated by the composition of the juice. Air in juice interferes with measuring the Brix value by spindle hydrometer. The relation of soluble solids, density and refractive index is affected by the proportion of constituents, particularly sugars and citric acid. Because the measurement is routine, entrusted to laboratory technicians, probably insufficient attention has been given to the development of empirical, standardized methods assuring uniform results.

The possibility of manufacturing substantially dehydrated citrus juices calls attention to the need for methods for estimating residual moisture. It appears probable that titration methods will be best for routine tests. If satisfactory commercial products become available, the development of dependable, uniform analytical methods will be necessary for comparisons of drying methods, and the determination of the effect of residual moisture upon the keeping qualities of powdered or granular material. Dependable information on this subject will in turn be necessary before commercial operations can be successful.

The estimation of ascorbic acid in citrus juice products by dye titration may be affected by metals dissolved from containers. Improved, standardized methods for determining metals and ascorbic acid are needed to insure comparable results.

The quantity of air closed in containers of citrus juice products is a factor in determining keeping quality. The amounts of air involved are small, and while individual investigators have developed valuable tests, standardized accurate methods would be a valuable adjunct in improving and standardizing keeping quality.

This substantially completes the list of research projects which have been nationally approved by the Citrus Products Research Council as being important in all citrus areas in relation to the improvement of existing citrus products and the development of additional desirable products. Citrus processors who encounter problems in their operation are invited to communicate with any officer or member of the Citrus Products Research Council for the purpose of having such problems considered for adoption in the Council's program.

Additional Research Problems

State Sections have discussed additional problems of local and national interest. In California the development of improved methods for utilizing Navel oranges has been emphasized.

In Florida, methods for preserving tangerine juice have been discussed. Ordinary canning methods result in a product which deteriorates rapidly. Work is needed on methods of extracting the juice, on the possibility of blending it with other juices, particularly grapefruit juice, and the use of special methods of processing or addition of "stabilizers" which might prevent or defer undesirable flavor changes.

From sources in and outside of the Research Council, have come suggestions for timely projects. Some of them are worth mentioning, such as:

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CITRUS PRODUCTS RESEARCH PROBLEFS

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1—The preparation of canned citrus products, jelled with low-methoxy pectins.

2—Additional uses for pectin and other citrus peel derivatives.

3—Also additional uses for citrus final syrup.

4—Study of the reason why synthetic ascorbic acid seems to have a lower antiscorbutic power than an equivalent quantity of citrus juice.

5—The chemical composition and quantitative studies of capillary fragility and permeability factors in citrus fruits.

6—The possible presence and nature of additional supplemental dietary factors in citrus fruits.

7—Riboflavin changes in citrus fruits during ripening.

8—Antirachitic tests of citrus juices.

9—The composition of, and changes in the juice-sac oils of citrus juices as differentiated from peel oils.

10—Data on all the physical and chemical properties of citrus fruit constituents including resperidin, naringin, maringenin, hesperetin, decumain, citronetin, aurantin, aeglein, and aurantiamarine.

11—Methods of subdividing citrus processing residues for cattle feed manufacture, and the effect upon drying properties and the quality of dried products.

12—A detailed qualitative and quantitative study of all the factors involved in the darkening, staling, and sterile gassing of packaged citrus juice products.

13—The cleaning and sterilizing of citrus fruits by the use of wetting agents, detergents, or other substances.

14—A study of methods and materials for cleaning and sterilizing plant processing equipment.

15—The study of methods for disposing of plant wastes and effluents under varying conditions of operation is a matter of constant importance, but is reaching a stage where it is becoming a problem of local application of methods, which have been demonstrated.

16—Perhaps the most timely and important of all research problems in the field is extending and increasing the use of citrus products. Physical examinations in conjunction with the Selective Act and other health surveys have revealed the prevalence of nutritional deficiency diseases in this country which is perhaps the best fed in the world. Citrus juices and concentrates contain vitamins and minerals to an extent found in few common foods adaptable to general consumption in large quantities. Unfortunately large quantities of these products have been required for government purchases for lend lease shipment to our allies and for use by our military forces.

Government purchases have been reduced and production facilities have been explained until at the moment a problem is the development of means of persuading people to use increasing quantities of these natural and balanced foods instead of satiating their appetites with synthetic preparations consisting of purified sugar, acid, flavor, color and water.

The problem is complicated by the fact that the synthetic mixtures are widely advertised while the natural fruit juice may be individually controlled and packed by anyone, and no method for developing and maintaining a continuous educational and advertising program has yet been devised.

Nevertheless, the extension of the uses of pectin, citrus oils, juice and feed products remains an outstanding problem for investigation and is considered of considerable immediate importance by citrus product technologists.

Reduction in Peel Oil

The author of this outline has given attention to factors affecting the reduction of peel oil in citrus juices during deaeration. The analytical method employing steam distillation has been modified to provide for continuous operation under vacuum as a means of efficiently deaerating while effecting a partial separation of less stable constituents of peel oil.

Using a continuous, single-pass deaerator, the author obtained data which indicate that this separation process is not simply a steam distillation of immiscible oil, but is at least partially a fractionation, of partially miscible liquids.

Laboratory tests indicated the feasibility of reducing the oil content of the juice by allowing it to enter the top and pumping the juice from the bottom of a fractionating

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Soil Science Society To Hold Annual Meeting

The Eighth Annual Meeting of the Soil Science Society of Florida will be held at West Palm Beach on April 4 and at the Everglades Experiment Station at Belle Glade on April 5.

The sessions will cover a number of topics of importance to Florida growers, cattlemen and others interested in soil and water conservation. Subjects dealing with animal nutrition, water control and conservation and with the production of vegetable fibers will be discussed by leading scientists of Florida and the nation.

"Soils in Relation to Animal Nutrition" will be discussed at a meeting in the Pennsylvania Hotel, West Palm Beach, beginning at 9:30 a. m. April 4.

"Importance of Water Conservation to the Future Development of South Florida" at the same hotel at 2:00 p. m., April 4.

"Production of Long Vegetable Fibers in Florida with particular Reference to Ramie," at the Everglades Experiment Station, Belle Glade, at 10:00 a. m. April 5.

Aside from the program of addresses and discussions, business sessions and banquets will serve to make the meeting one of social as well as material importance.

The program for the water conservation session follows:

1. Review of progress since 1943 in the management and operation of the Everglades Drainage District. J. E. Beardsley, Everglades Drainage Board, Clewiston, Florida.

2. A general review of the soil survey in South Florida with particular reference to land use and water conservation. W. T. Hearn, Bureau Plant Industry, Soils and Agr. Eng., Beltsville, Maryland.

3. A summary of surface water relationships in South Florida. Dean Bogart, U. S. Geological Survey, Miami, Florida.

4. A general review of the municipal water supply for South Florida. Gerald G. Parker, U. S. Geological Survey, Miami, Florida.

5. Wild life protection and conservation in relation to the development of the natural parks and preserves of South Florida. Victor H. Cahalane, Biologist, National Park Service.

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Outlook For Increased Fertilizer Production Improves . . .

Convincing evidence is now at hand to show that the fertilizer industry is taking long strides toward providing American farmers with increased supplies of fertilizer nitrogen, Maurice H. Lockwood, President of The National Fertilizer Association, said recently.

"It should be made clear, however," said Lockwood, "that the necessity of correlating and in some cases constructing and equipping nitric acid and graining units with war-time fixation plants is a big job and may require eight to twelve months' time. Industry is proceeding as rapidly as possible with the job and besides already taking over five Government plants, has indicated its readiness to adapt for practical commercial production other Government plants currently operated for the Army ordinance program."

The current issue of the Fertilizer Review, published by the Association, presents a study of the progress being made, including industry's conversion of the five Government nitrogen fixation and conversion plants to peace-time use. "The capacity of these five plants to produce nitrogen for agricultural use amounts to 475,000 tons annually," states the Review.

This capacity amounts to about 28 percent more nitrogen than was used for agriculture in the entire United States and its posessions during the average of the five years before the war 1935-39 and two-thirds as much nitrogen as will be available to United States agriculture for the 1946-47 fertilizer year. In addition, there is a production capacity in privately owned synthetic plants constructed before the war of an estimated 431,000 tons of nitrogen, a production capacity of approximately 143,500 of by-product nitrogen from coke and indicated imports of some 200,000 tons of nitrogen in various forms. The Review further points out that all three of the Canadian nitrogen fixation plants now taken over by industry will provide a substantial proportion of their fertilizer nitrogen output to the United States for agricultural use.

Classified Ads

Phillip B. Wolfe, Expert Irrigation Engineer, Passes

Philip B. Wolfe, expert irrigation engineer, who for twenty-seven years was with the Cameron & Barkley Co., and who is credited with developing citrus grove irrigation in Florida, died at his home in Tampa March 24.

Mr. Wolfe was well known to Florida citrus growers, many of whom he had assisted with expert advice in the installation of irrigation systems in their groves. As sales engineer for his company and as an expert in his field, he assisted growers in the location of their wells, the choice of their pumps and piping systems and other features of grove irrigation.

Mr. Wolfe was the author of numerous articles on irrigation which were widely published and which contributed materially in the development and popularizing of irrigation among Florida growers. His pleasing personality gained for him a wide circle of sincere friends throughout the state.

CITRUS PRODUCTS RESEARCH PROBLEMS

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column operated under vacuum while introducing steam near the base of the column and pumping out the vapors from the top.

By controlling the admission of steam and the pressure in the column so that the juice leaving the fractionator is at the same temperature as the juice entering, there is no gain or loss in volume of the juice, while air and excessive oil

In order to avoid the possibility of dilution, a modified design was developed in which vapor generated from the juice itself was substituted for steam from an outside source. While this complicated the design of equipment for continuous, sanitary operation, no insurmountable difficulty was encountered.

This list of research projects of national and sectional interest might be extended indefinitely, but those which have been listed indicated the scope of work which might benefit the industry.

SOIL SCIENCE SOCIETY TO HOLD ANNUAL MEETING

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Chicago, Illinois.

6. Progress of the unit plan of reclamation in the Everglades area. Lamar Johnson, Everglades Drainage District, West Palm Beach, Florida.

7. Hyacinth control thru the use of 2,4-D in various forms and at various rates of application. R. V. Allison and C. C. Seale, Everglades Experiment Station, Belle Glade, Florida.

8. The need for more detailed climatological studies in South Florida. W. J. Milligan, U. S. Weather Bureau ,Everglades Experiment Station, Belle Glade, Florida.

9. An outline and discussion of needed legislation for local and statewide water conservation and control. Ralph J. Blank, P. B. County Recources Development Board, West Palm Beach, Florida.